

# PORTABLE COMPUTER DISPLAY TILT/SWIVEL MECHANISM

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to portable computer display, and more specifically, to a portable computer display screen which can tilt and swivel about two orthogonal axes.

### 2. Description of the Related Art

Beginning in the mid-1980's, portable computers, alternately known as either laptops or notebook computers, have expanded in popularity and at an astonishing rate. Such computers are lightweight and have a display screen supported by a hinged cover that protects the keyboard when the computer is not being operated.

Liquid crystal displays (LCDs) are used in many personal computer screens. LCDs are desirable for personal computers in that they are lightweight and have an extremely low power consumption in contrast to cathode ray tube (CRT) displays of conventional desktop computers. In addition, an LCD generally retains a great clarity of display in the presence of bright light.

All of the recent technological advances in portable computer displays have been directed toward improving the visual clarity of the information for a single operator sitting directly in front of the keyboard. However, when the user of a portable computer wants to show the displayed information to other people, they must crowd behind the personal computer or physically turn the computer base to show the information. Given that the typical size of portable computers are smaller than a brief case, and the screen are concurrently small, it is awkward for more than one or two people to view the display of a laptop computer. Furthermore, a sudden movement of a computer while the disk is spinning may induce a head crash. Thus, there is a need for a personal computer which can easily display the information to more than one person without having to shift the base of the computer.

In addition, portable computers are often used on airplanes. It is inconvenient to place the portable computer on the drink tray in front of the user, and instead is preferable to place the computer on the tray next to the user. Without dangerously angling the computer off the end of the drink tray, the user must operate the keyboard and try to read the information on the display screen from approximately a 45° angle. There is thus a need for a portable computer which can be operated from an adjacent airline seat and which displays the information directly to the operator.

## SUMMARY OF THE INVENTION

The present invention provides a tilt and swivel mechanism which allows adjustment of a portable computer display in two axes. The mechanism provides conventional tilt movement of the display from a horizontal closed position to an open position of approximately 115° from the closed position. The invention also provides for swiveling of the display about a vertical axis to an angle of 30° to the right or left from directly straight-forward.

In accordance with the preferred embodiment of the present invention, the tilt swivel mechanism comprises a single unit hinge assembly incorporating the tilt and

swivel features in one unit. The tilt and swivel hinge is preferably located at the rear center of the portable computer and provides sufficient support for conventional display screens. The tilt/swivel hinge may include a cosmetic cover for concealment purpose.

The preferred tilt/swivel hinge comprises a swivel disk which fits between two identical halves of a swivel ring having an inner groove receiving the swivel disk, and a tilt base and an attachment yoke mounted on the swivel disk. The computer display screen mounts to a flange on the attachment yoke which tilts about a tube extending through the arms of the yoke and through an aperture in the tilt base. The tilt base, with the attachment yoke of the computer display screen, is then mounted to the swivel disk which fits within the two halves of the swivel mounting ring. Thus, the computer display screen tilts relative to the tilt base which in turn, swivels relative to the computer base.

In a preferred embodiment, substantially all of the swivel/tilt hinge assembly comprises plastic parts for weight and economic considerations. Several built-in mechanical stops in the swivel/tilt hinge limit the tilt to 115° from horizontal and the swivel to an arc of 60°, or 30° in each of the clockwise and counter-clockwise directions from straight-forward.

In accordance with a further embodiment of the present invention, the tilt/swivel assembly includes a built-in cable tunnel for communication between the base and the display screen. In addition, a washer comprising a non-sticking material such as Teflon® or a lubricated washer is disposed between the attachment yoke and tilt base for smooth tilt operation.

The present invention provides a tilt/swivel hinge constructed from a minimum number of parts primarily of plastic which also has strength to support computer display screens of 1-2 lbs.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective front view showing a personal computer incorporating a tilt/swivel hinge of the present invention with the display screen tilted open.

FIG. 2 is a perspective front view showing a personal computer incorporating a tilt/swivel hinge of the present invention with the display screen tilted open and swiveled counter-clockwise.

FIG. 3 is a side elevational view of the tilt/swivel hinge mechanism installed in the portable computer of FIG. 1, shown in phantom, with the display screen closed.

FIG. 4 is a detailed side elevational view of the hinge mechanism of FIG. 3.

FIG. 5 is a side elevational view of the tilt/swivel hinge mechanism installed in the portable computer of FIG. 1, shown in phantom, with the display screen tilted open.

FIG. 6 is a detailed side elevational view of the hinge mechanism of FIG. 5.

FIG. 7 is a perspective view of the assembled tilt/swivel hinge of FIG. 1 showing one path for cabling.

FIG. 8 is a perspective view of the assembled tilt/swivel hinge of FIG. 1 showing an alternative path for cabling.

FIG. 9 is a perspective exploded view of the tilt/swivel hinge of FIGS. 7 and 8.